Lower Pliocene Progradational (LP P1) Play

Textularia "X" biozone

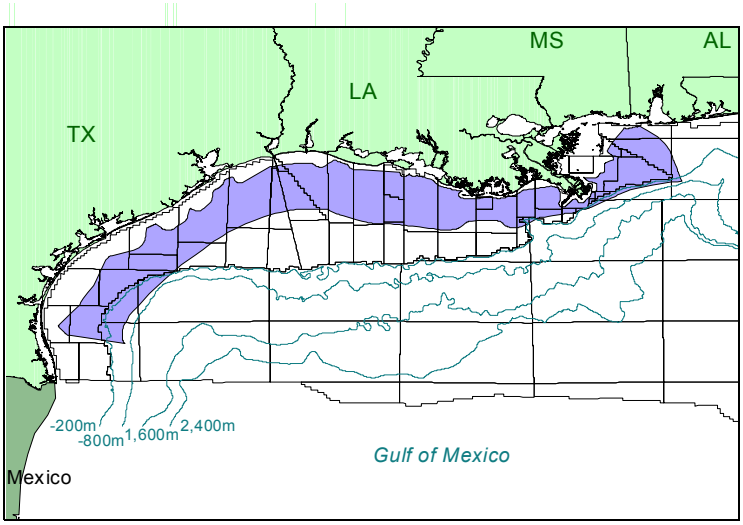

Figure 1. Play location.

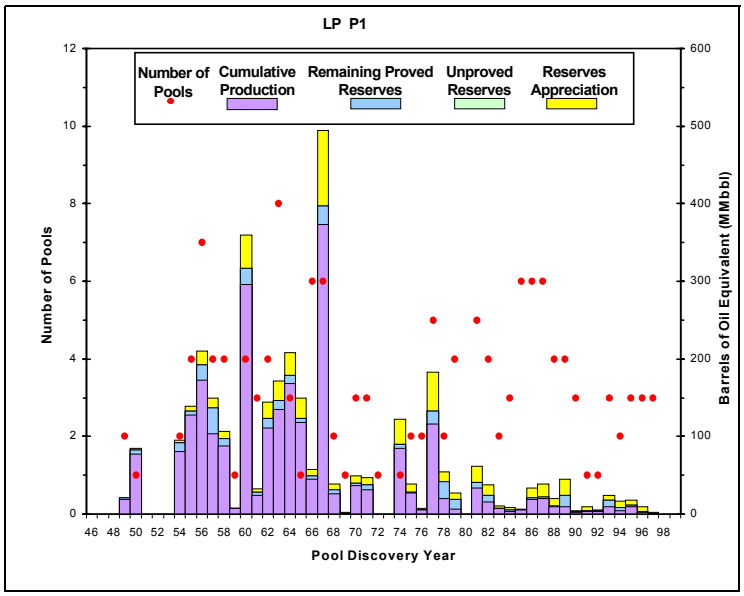

Figure 2. Exploration history graph showing reserves addition and number of pool discoveries by year.

LP P1 Play 145 Pools 752 Sands	Minimum	Mean	Maximum
Water depth (feet)	13	109	674
Subsea depth (feet)	1184	8953	15990
Number of sands per pool	1	5	36
Porosity	20%	29%	38%
Water saturation	16%	28%	61%

Table 1. Pool attributes. Values are volume-weighted averages of individual reservoir attributes.

Play Description

The established Lower Pliocene Progradational (LP P1) play is the fourth largest play in the Gulf of Mexico Region on the basis of cumulative production. The play occurs at the *Textularia* "X" biozone and extends from the North Padre Island and Port Isabel Areas offshore Texas to the Destin Dome Area of offshore Alabama (figure 1). Productive progradational deposits are found in a continuous band from the West Cameron Area to the eastern extent of the play, but occur very sporadically west of the West Cameron Area.

Except where the LP P1 play extends onshore into Texas and Louisiana, the updip limit of this progradational play occurs where it grades into the nearshore deposits of the Lower Pliocene Aggradational (LP A1) play. To the northeast and southwest, the LP P1 play is limited by a marked decrease in sediment influx at the edges of the LP depocenter. Downdip, the LP P1 play grades into slope shales and the deposits of the Lower Pliocene Fan 1 (LP F1) play.

Progradational deposits in offshore Texas areas southwest of the West Cameron Area are rare. The depocenter present in the offshore Texas area during upper upper Miocene (UM3) time no longer received significant amounts of sand-rich sediments during LP time, reflecting the depocenter shift from offshore Texas to the ancestral Mississippi River Delta System.

Play Characteristics

Sediments in the LP P1 play represent major regressive episodes of outbuilding of both the shelf and the slope. Additionally, retrogradational, reworked sands with a thinning and backstepping log signature locally cap the play. Because these retrogradational sands are poorly developed and discontinuous, they

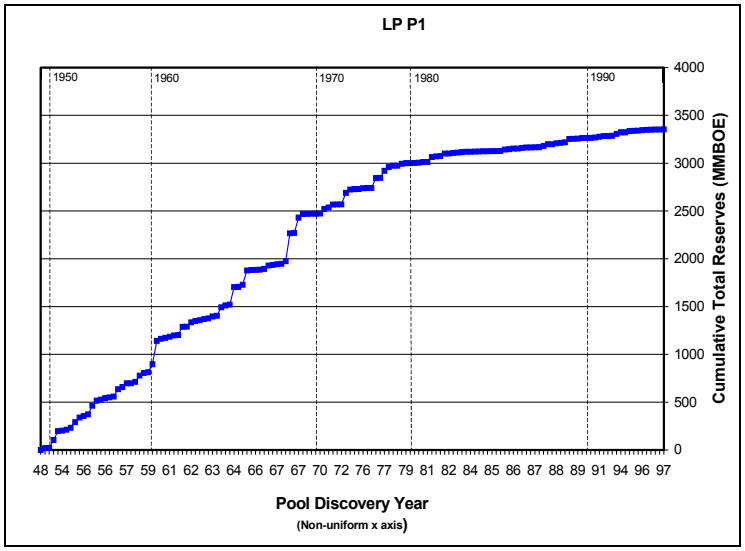

Figure 3. Plot of pools showing cumulative reserves by discovery order. Note the non-uniform x axis.

LP P1 Play Marginal Probability = 1.00	Number of Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Reserves				
Original proved	145	1.354	7.929	2.765
Cumulative production	–	1.233	6.880	2.457
Remaining proved	–	0.121	1.049	0.307
Unproved	0	0.000	0.000	0.000
Appreciation (P & U)	–	0.284	1.710	0.588
Undiscovered Conventionally Recoverable Resources				
95th percentile	–	0.064	0.687	0.198
Mean	30	0.095	0.831	0.243
5th percentile	–	0.129	0.979	0.290
Total Endowment				
95th percentile	–	1.702	10.326	3.551
Mean	175	1.733	10.470	3.596
5th percentile	–	1.767	10.618	3.643

Table 2. Assessment results for reserves, undiscovered conventionally recoverable resources, and total endowment.

are included as part of the LP P1 play.

About one-third of the fields in this play are structurally associated with salt diapirs with hydrocarbons trapped on diapir flanks or in sediments draped over diapir tops. Other fields are associated with normal faults and growth fault anticlines. Some fields also contain hydrocarbon accumulations trapped by permeability barriers, updip pinchouts, or facies changes. Seals are provided by the juxtaposition of reservoir sands with shales and salt, either structurally (e.g., faulting, diapirism) or stratigraphically (e.g., lateral shale-outs, overlying shales).

Discoveries

The LP P1 mixed oil and gas play contains total reserves of 1.638 Bbo and 9.639 Tcfg (3.353 BBOE), of which 1.233 Bbo and 6.880 Tcfg (2.457 BBOE) have been produced. The play contains 752 producible sands in 145 pools, and all 145 of these pools contain proved reserves (table 1; refer to the Methodology section for a discussion of reservoirs, sands, and pools). The first reserves discovered in the play occurred in the Eugene Island 89 and Ship Shoal 28 fields in 1949 (figure 2). Maximum yearly total reserves of 495 MMBOE were added in 1967 when six pools were discovered, including the largest pool in the play, in the South Pass 61 field with 292 MMBOE in total reserves (figures 2 and 3). Though discoveries have averaged about three per year, reserves have declined significantly since the late 1960's. Ninety-seven percent of the play's total reserves and ninety-nine percent of the play's cumulative production have come from pools discovered before 1990. The most recent discovery, prior to this study's cutoff date of January 1, 1999, was in 1997.

The 145 discovered pools contain 2,169 reservoirs, of which 928 are nonassociated gas, 1,069 are undersaturated oil, and 172 are saturated oil. Cumulative production

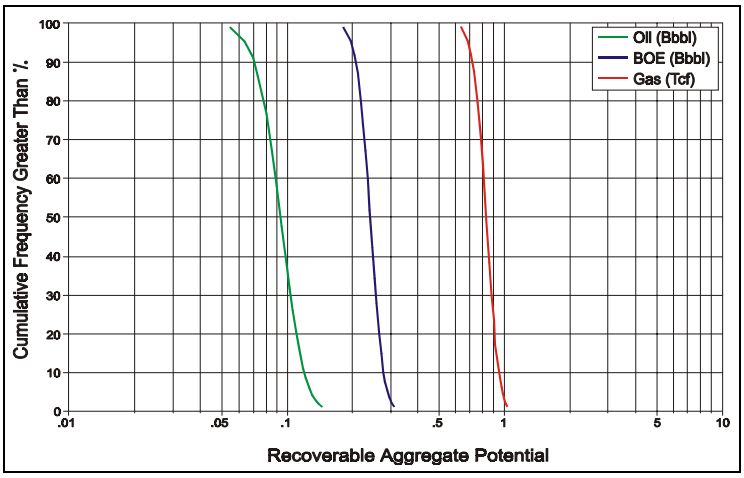

Figure 4. Cumulative probability distribution for undiscovered conventionally recoverable resources.

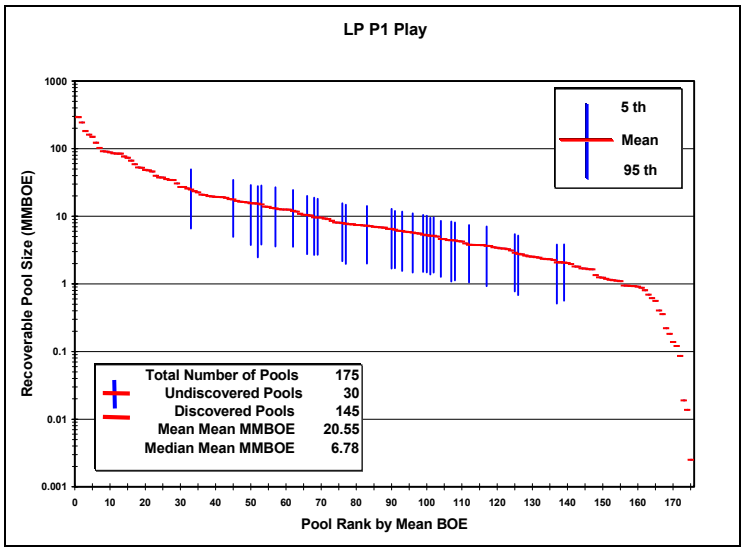

Figure 5. Pool rank plot showing the number of discovered pools (red lines) and the number of pools forecast as remaining to be discovered (blue bars).

has consisted of 50 percent gas and 50 percent oil.

Of the 87 assessed Gulf of Mexico Region plays, the LP P1 play contains the fourth largest amount of BOE cumulative production. In fact, the play has produced the third largest amount of oil, at 11 percent of the total for the Region.

Assessment Results

The marginal probability of hydrocarbons for the LP P1 play is 1.00. This play has a mean total endowment of 1.733 Bbo and 10.470 Tcfg (3.596 BBOE) (table 2). Sixty-eight percent of this BOE mean total endowment has been produced.

Assessment results indicate that undiscovered conventionally recoverable resources (UCRR) have a range of 0.064 to 0.129 Bbo and 0.687 to 0.979 Tcfg at the 95th and 5th percentiles, respectively (figure 4). Mean UCRR are estimated at 0.095 Bbo and 0.831 Tcfg (0.243 BBOE). These undiscovered resources might occur in as many as 30 pools, the largest of which has a mean size of 25 MMBOE (figure 5). The five largest undiscovered pools occupy positions 33, 45, 50, 52, and 53 on the pool rank plot. For all the undiscovered pools in the LP P1 play, the mean mean size is 8 MMBOE, which is substantially smaller than the 23 MMBOE mean size of the discovered pools. The mean mean size for all pools, including both discovered and undiscovered, is 21 MMBOE.

Of the 13 progradational plays in the Gulf of Mexico, the LP P1 play is projected to contain the second largest amount of mean undiscovered conventionally recoverable oil resources.

The LP P1 is a super-mature play with BOE mean UCRR contributing only 7 percent to the play's BOE mean total endowment. Limited exploration potential exists in deeper LP P1 sections around salt structures where the play may not be adequately tested.